Trend Study 15-6-99

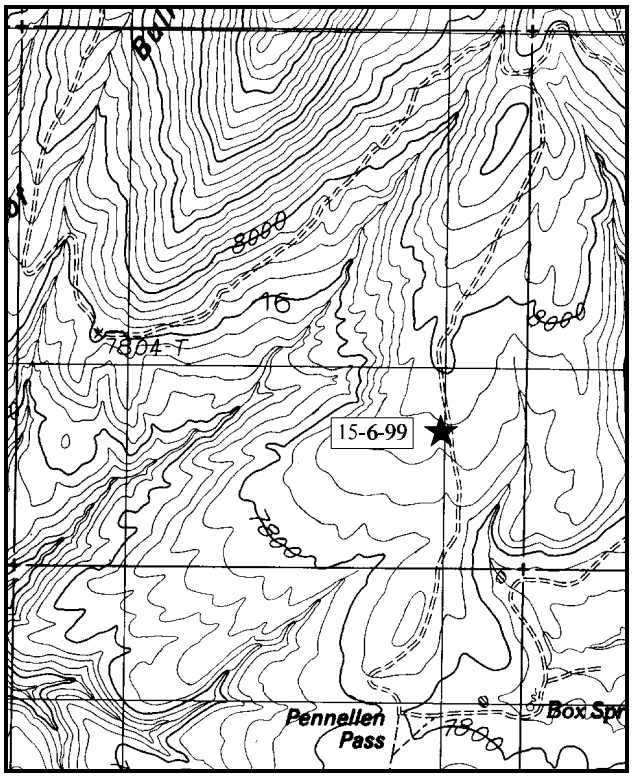
Study site name: Box Springs Chaining . Range type: Chained, Seeded P-J .

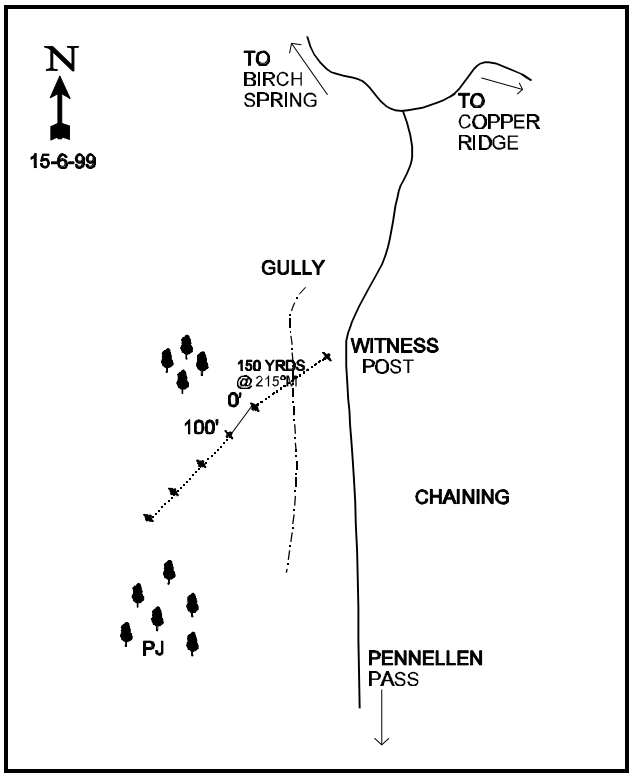
Compass bearing: frequency baseline 204°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Birch Spring (T32S, R10E, Sec. 6), proceed southwest for 5.1 miles to a major intersection. Turn right (south) towards Pennellen Pass, and go 0.7 miles. A witness post on the right side of the road marks the transect location in the chaining. The 0-foot baseline stake, a 2-foot tall fence post, is approximately 150 yards from the road and is marked by a red browse tag, #7134. This study runs approximately southwest but since it follows the line of a study established in dense P-J before the chaining.





Map Name: Mount Ellen Diagrammatic Sketch

Township 32S , Range 10E , Section 16 UTM 4207744.556 N, 516878.631 E

DISCUSSION

Trend Study No. 15-6 (38-6)

The Box Springs Chaining study monitors range trend on a parcel of state land that was chained and seeded in 1984. Prior to the chaining, the site supported a dense stand of tall, mature pinyon with much fewer numbers of juniper. The elevation at the site is 7,900 feet which slopes gently to the south. The estimated mean annual precipitation is between 12 and 14 inches. Water is available for livestock and wildlife at Box Springs which is located about one-fourth mile southeast of the site. The state land is included within the Pennell Allotment (BLM) grazing program and is leased by the Division of Wildlife Resources. The chaining is a key use area for buffalo, which utilize the area mostly during the late spring and summer. A road bisects the chaining and is about one-fourth mile from the study site. Human use is expected to be light, with the exception of deer and buffalo hunts, and occasional use made by sightseers and livestock permittees. Pellet group data collected in 1999 indicate light use by wildlife and moderate use by livestock. This data showed 5 deer days use/acre (13 ddu/ha) and 38 cow days use/acre (95 cdu/ha). Buffalo use was estimated at 15 buffalo days use/acre (37 bdu/ha). Nearly all of the cow pats were at least from last fall, while the deer and buffalo are mostly from the spring and winter. This site was read on the 3rd of June.

Soil texture is a gravelly, sandy clay loam with a neutral pH (7.3). Rocks and small boulders are abundant on the soil surface and throughout the upper 2 decimeters of the profile. The soil is fairly deep with an estimated effective rooting depth of nearly 16 inches. The soil surface is well protected by rock, vegetation, and litter cover which accounted for approximately 86% of the ground cover in 1987, 89% in 1994 and 91% by 1999. There is a slight decrease in relative cover of bare ground in 1999 coupled with an increase in pavement. There is evidence of light erosion with surface soil movement and minor pedestaling being noted around bunch grasses. However, protective ground cover from vegetation and litter is still high in relation to bare ground, thus minimizing erosion.

Young pinyon and juniper not removed by the chaining treatment were estimated at 233 and 100 trees per acre, respectively during the 1987 reading. Point quarter data from the 1994 and 1999 readings give a better estimate with a much larger sample size. The densities for pinyon and juniper were on average estimated at respectively 78 and 45 trees/acre in 1994 and 1999. Basal diameter of pinyon was estimated at 3.5 inches in 1999, with juniper being just over three inches. Thirty-nine percent of the juniper and 10% of the pinyon sampled in 1999 were knockdown trees from the chaining. Pinyon and juniper currently provide 66% of the browse cover at this site.

Broom snakeweed is the most abundant shrub on the site with an estimated density of 800 plants/acre in 1994, decreasing to 620 plants/acre in 1999. This species appears to be stabile with an evenly distributed age class. Bitterbrush planted by seed dribblers during the chaining was estimated at 266 seedlings/acre in 1987. By 1994, there was an estimated 120 bitterbrush plants/acre. Utilization was light and vigor good. By 1999, bitterbrush density is estimated at 100 plants/acre. There is no recruitment for bitterbrush with no seedling or young plants being sampled in 1999. Currently, 80% of the plants sampled show heavy use. These plants have received continual heavy use due to the low density and preference by wildlife resulting in a decumbent growth form. Mountain big sagebrush is also present on the site, but infrequent.

Intermediate wheatgrass and Fairway crested wheatgrass are the predominant seeded grasses. In 1999, both species remain at similar nested frequency and cover levels to those in 1994. Utilization was light on these species when the site was read in June 1999. Other seeded grasses include: smooth brome, sheep fescue, orchard grass, and Great Basin wildrye. Orchard grass and basin wildrye are infrequent, while sheep fescue and smooth brome slightly increased in nested frequency in 1999. Alfalfa was the most abundant forb in 1987 with a quadrat frequency of 31%. This alfalfa, a rhizomatous variety, was expected to increase on this site. However, with the continuing drought conditions which have occurred since the late 1980's and the resulting heavy use of the chainings by livestock and buffalo, alfalfa has declined significantly. It was

sampled in only one quadrat in both 1994 and 1999. Another seeded forb, small burnet, was also fairly common during the 1987 reading, but has declined significantly from a quadrat frequency of 14% to only 3% in 1994, and 1% in 1999.

1994 TREND ASSESSMENT

Due to the gentle terrain and abundant herbaceous vegetation, erosion is not a problem on this site. Ground cover characteristics in 1994 are similar to those of 1987 indicating a stable soil trend. Shrubs are not an important aspect on this site when it is noted that all together, they only contribute a little more than 10% of the total vegetative cover. Broom snakeweed is the most abundant shrub on the site, but its numbers are still low at 800 plants/acre with a biotic potential of only about 3%. An estimated 120 young and mature antelope bitterbrush were found growing on the site. Trend for browse is stable. The herbaceous understory is still abundant, making up 87% of the vegetative cover. The composition has changed however, as sum nested frequencies of grasses have increased while those of forbs have declined by 63%. Seeded forbs alfalfa and small burnet, which used to be the dominant forbs on the chaining, have declined significantly. Combined nested frequencies of grasses and forbs have declined slightly indicating a stable to slightly declining trend with the continuing drought.

TREND ASSESSMENT
soil - stable
browse - stable, but unimportant for this site
herbaceous understory - stable to slightly declining; up for grasses, but down for seeded forbs

1999 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics to 1994. The proportion of protective ground cover to bare ground remains sufficient to minimize erosion. Browse trend for bitterbrush is stable even with mostly heavy use and lack of recruitment. This is because there are no decadent plants or plants with poor vigor, and it is a relatively long-lived species. The key species (preferred) all together, only make up one-third of the browse cover, and the browse total cover only make up less than 20% of the total vegetative cover. The majority of the browse cover on this site is actually contributed by pinyon and juniper. Herbaceous understory trend is stable. Intermediate and crested wheatgrass have remain at similar levels to the previous reading. Perennial grass sum of nested frequency slightly increased in 1999. Sum of nested frequency for forbs also increased, although the forbs are insignificant on this site with the loss of the two preferred species, alfalfa and small burnet. Total forb cover is less than one percent.

TREND ASSESSMENT
soil- stable
browse- stable
herbaceous understory-stable

HERBACEOUS TRENDS --
Herd unit 15 , Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'94	'99	'87	'94	'99	'94	'99
G	Agropyron cristatum	167	187	186	68	75	74	6.28	6.65
G	Agropyron intermedium	227	216	198	84	76	68	7.56	6.84
G	Bromus inermis	78	94	97	35	35	39	2.31	2.99
G	Dactylis glomerata	$_{b}$39	$_{a}$21	$_{a}$10	19	10	4	1.59	.07
G	Elymus cinereus	$_{a}$-	$_{ab}$5	$_{b}$6	-	2	3	.18	.33
G	Festuca ovina	$_{a}$62	$_{b}$101	$_{c}$139	31	42	58	5.35	6.50
G	Sitanion hystrix	1	-	2	1	-	1	-	.00
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		574	624	638	238	240	247	23.30	23.39
Total for Grasses		574	624	638	238	240	247	23.30	23.39
F	Arabis spp.	6	7	4	2	3	2	.01	.01
F	Astagalus cicer	1	7	6	1	3	3	.04	.12
F	Aster spp.	-	3	-	-	1	-	.00	-
F	Chaenactis douglasii	$_{a}$-	$_{b}$6	$_{ab}$3	-	4	2	.04	.06
F	Descurainia pinnata (a)	-	-	3	-	-	1	-	.00
F	Hymenoxys acaulis	-	1	1	-	1	1	.00	.00
F	Ipomopsis aggregata	-	-	3	-	-	1	-	.00
F	Lappula occidentalis (a)	-	2	-	-	1	-	.00	-
F	Lesquerella kingii	$_{ab}$19	$_{a}$8	$_{b}$36	10	3	17	.01	.16
F	Machaeranthera canescens	-	3	3	-	1	1	.03	.03
F	Medicago sativa	$_{b}$66	$_{a}$1	$_{a}$1	31	1	1	.03	.00
F	Onobrychis viciaefolia	$_{a}$-	$_{b}$5	$_{b}$-	-	4	-	.09	-
F	Penstemon palmeri	1	-	-	1	-	-	-	-
F	Polygonum douglasii (a)	-	2	-	-	1	-	.00	-
F	Sanguisorba minor	$_{b}$32	$_{a}$3	$_{a}$1	14	3	1	.19	.00
Total for Annual Forbs		0	4	3	0	2	1	0.00	0.00
Total for Perennial Forbs		125	44	58	59	24	29	0.47	0.40
Total for Forbs		125	48	61	59	26	30	0.48	0.40

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 15 , Study no: 6

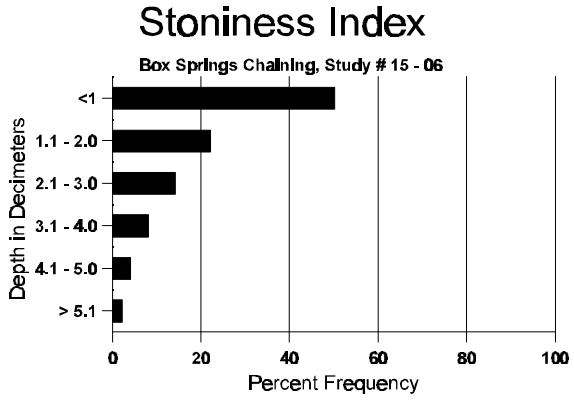
Type	Species	Strip Frequency '94	Strip Frequency '99	Average Cover % '94	Average Cover % '99
B	Artemisia tridentata vaseyana	4	2	.18	1.28
B	Chrysothamnus nauseosus graveolens	0	0	-	-
B	Echinocereus spp.	0	1	-	.00
B	Gutierrezia sarothrae	7	7	.18	.06
B	Juniperus osteosperma	0	4	3.15	2.34
B	Pinus edulis	0	4	.06	1.32
B	Purshia tridentata	6	5	.15	.56
Total for Browse		17	23	3.73	5.58

BASIC COVER --
Herd unit 15 , Study no: 6

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '87	Average Cover % '94	Average Cover % '99
Vegetation	322	329	11.25	26.25	32.29
Rock	199	169	1.50	5.50	5.53
Pavement	189	206	.50	1.02	6.64
Litter	393	380	73.25	50.34	59.68
Cryptogams	-	6	0	0	.03
Bare Ground	227	219	13.50	11.39	10.23

SOIL ANALYSIS DATA --
Herd Unit 15, Study # 06, Study Name: Box Springs Chaining

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.8	48.0 (16.4)	7.3	48.0	23.4	28.6	3.7	13.1	137.6	1.0



PELLET GROUP DATA --
Herd unit 15 , Study no: 6

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	6	34	N/A
Deer	1	12	5 (12)
Cattle	-	6	38 (94)
Buffalo	7	4	15 (37)

BROWSE CHARACTERISTICS --
Herd unit 15 , Study no: 6

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80	18	20	4
	99	1	1	-	-	-	-	-	-	-	2	-	-	-	40	25	33	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'94	00%	00%	00%	-50%
'99	50%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'87	0		-
	'94	80		-
	'99	40		-

Chrysothamnus nauseosus graveolens																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	40	18	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'87	0		-
	'94	0		-
	'99	0		-

Echinocereus spp.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'87	0		-
	'94	0		-
	'99	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	16	-	-	-	-	-	-	-	-	16	-	-	-	320			16
	99	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
M	87	3	-	-	-	-	-	-	-	-	3	-	-	-	100	10	6	3
	94	24	-	-	-	-	-	-	-	-	24	-	-	-	480	7	8	24
	99	16	-	-	-	-	-	-	-	-	16	-	-	-	320	4	5	16
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	6	-	-	-	-	-	-	-	-	-	-	-	6	120			6
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'94	00%	00%	00%	+88%
'99	00%	00%	19%	-23%

Total Plants/Acre (excluding Dead & Seedlings)				
'87	100	Dec:		0%
'94	800			0%
'99	620			19%

Juniperus osteosperma																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	66	Dec:		-
'94	0			-
'99	80			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Pinus edulis																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
Y	87	6	-	-	-	-	-	-	-	-	6	-	-	-	200			6
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33	169	79	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	233	Dec:	-
	'94	0		-
	'99	80		-

Purshia tridentata																		
S	87	8	-	-	-	-	-	-	-	-	8	-	-	-	266			8
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	4	-	-	-	-	-	-	-	4	-	-	-	80	4	9	4
	99	1	-	-	-	-	2	-	-	2	5	-	-	-	100	4	17	5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'94	67%	00%	00%	-17%
'99	00%	80%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'94	120		-
	'99	100		-